

B. Terminology

Abbreviations of terms and values of some parameters used throughout the report

1.0 WATER TEMPERATURE

EWT	Entering water temperature
LWT	Leaving or return water temperature
WTD	Water temperature drop EWT-LWT (heating)
WTR	Water temperature rise LWT-EWT (cooling)
AWT	Average water temperature
ΔT	Temperature differential

2.0 AIR TEMPERATURE

EAT	Entering air temperature
LAT	Leaving air temperature
RA	Return air
EA	Exhaust air
OA	Outside air temperature
RT	Room temperature
DB	Dry bulb temperature
WB	Wet bulb

3.0 PIPES

HWS	Hot water supply
HWR	Hot water return
CHWS	Chilled water supply
CHWR	Chilled water return
OD	Outside diameter/inches
ID	Inside diameter/inches
ΔP	Differential pressure

4.0 POWER AND LOAD

EC	Energy consumed
EU	Energy useful
BTU/Hr	Heat flow or power in BTU/Hr
MBH	1000 BTU/Hr
Q	Heat loss or heat gain BTU/Hr

QT	Total load in BTU/Hr
QS	Sensible load in BTU/Hr

HP	Pump horse power
	$= \frac{\text{USGPM} \times \text{Ft Head} \times \text{S.G.}}{3960 \times \text{pump eff'y}}$

5.0 FLOW

USGPM	Flow of water in U.S. gallons per minute
Cv	Valve coefficient (USGPM at 1 psi pressure drop)
RF	Rangeability factor (control valve)

Kv	$\frac{\text{m}^3/\text{h}}{\sqrt{\Delta P(\text{bar})}}$
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B	Valve authority (control valve)
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6.0 PRESSURE

P	Water pressure in PSI
ΔP	Water pressure drop in PSI of water
ΔH	Differential pressure head in Ft of water pressure
H	Water pressure in Ft Head

7.0 SOME FORMULAS USED

BTU/Hr	$= 500 \times \text{GPM} \times \Delta T$ (water 40°F)
	$= 487 \times \text{GPM} \times \Delta Y$ (water 170°F)

USGPM	$= C_v \sqrt{\Delta P(\text{PSI})} = .66 C_v \sqrt{\Delta H(\text{Ft})}$
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Pumping costs in \$/year = 0.25 x USGPM x ΔH (@ \$0.10/KWH)

C. Definitions

Authority: The pressure drop of a control in the open position divided by its pressure drop in the closed position equals the valve authority. Ideally a value of .5 or more is desired.

Balancing: The act of adjusting flows in a hydronic circuit to obtain design conditions.

Balancing Valve: Calibrated valves with a pressure measuring port on each side of the seats, plus the following features: adjustment accuracy of $\pm 10\%$; positive shut-off; memory setter to maintain balance set point.

Cavitation: The forming and imploding of vapor bubbles in a liquid due to decreased, then increased, pressure as the liquid flows through a restriction.

Comfort: A state of ease, without stress caused by indoor air quality.

Control Loop: Chain of components which makes up a control system. If feedback is incorporated it is a closed loop; if there is no feedback, it is an open loop system.

Controlled Fluid: When applied to a valve, this term refers to whatever liquid is being regulated. For heating-cooling systems, this fluid can be hot or chilled water, steam or refrigerant.

Critical Pressure Drop: This applies to gases and vapors. It is the pressure drop which causes the maximum possible velocity through the valve.

Higher pressure drops will not increase the flow velocity.

Design Value: The desired flow or temperature in a piece of hydronic equipment the designer specifies for the system to perform properly.

Differential Pressure: The difference in pressure between any two points in a system.

Dynamic Pressure: The pressure of a fluid resulting from its motion. Total pressure - static pressure = dynamic pressure (pump head).

Flow Characteristic: Relations between flow through the valve and percent rated travel as the latter is varied from zero to 100 percent.

Flow Characteristic, Inherent: Flow characteristic when constant pressure drop is maintained across valve.

Flow Characteristic, Installed: Flow characteristic when pressure drop across valve varies as dictated by flow and related conditions in system in which valve is installed.

Flow Coefficient Cv: Number of U.S. gallons per minute of 60°F water that will flow through a fully open valve with a 1 psi drop across it.

Hydraulics: The branch of physics having to do with the mechanical properties of water and other fluids.

Hydronics: The science of heating and cooling with water.

Hydronic System: A heating or cooling system in which the heating/cooling medium is water.

Indoor climate: Conditions in a room or building that prevail. These conditions are influenced by air and surface temperatures, air circulation and velocity plus relative humidity.

Pressure Drop: The difference in pressure between any two points on a piece of equipment.

Rangeability: The rangeability factor (RF) of a control valve is the ratio between the maximum water flow for the valve fully open and the minimum water flow controllable under the same differential pressure. Normal valve rangeability is around 30.

Rated Flow: For a coil this is the flow through the coil which will produce full rated heat output of the coil.

Spring Range: Control pressure range through which the signal applied must change to produce total movement of the controlled device from one extreme position to the other.

Actual Spring Range: Control pressure range that causes total movement under actual conditions to overcome forces due to the spring force, fluid flow, friction, etc.

Nominal Spring Range: Control pressure range that causes total movement when there is no external force opposing the actuator.

Static Pressure: The pressure with respect to a surface at rest in relation to the surrounding fluid.

Stroke: This is synonymous to lift, travel and percent open. These are terms used when referring to the amount a valve has moved from either extreme of fully open or fully closed.

Terminal: 1; conductor point at which an electrical component may be connected to another electrical component. 2; conducting element of an equipment or circuit intended for connection to an external conductor. 3; device attached to a conductor to facilitate connection with another conductor. 4; point in a system or communication network at which data can either enter or leave.

Total Pressure: The sum of the Static Pressure and the Dynamic Pressure.

Three-way Valve: Valve with three connections, one of which is a common, and two flow paths.

By-pass or Diverting Valve: Common connection is the only inlet. Fluid entering this connection is diverted to either outlet.

Mixing Valve: Two connections are inlets and the common is the outlet. Fluid from either or both inlets is selected to go out the common connection.

Two-way Valve: Valve with two connections and a single flow path.

Valve Pressure Drop: Portion of the system pressure drop which appears across the valve. For valve sizing, this drop is across a fully open valve.